<u>In the Specification:</u>

Please amend the paragraph beginning on page 1, line 21 as follows:

A conventional OFDM transceiver is shown in Figure 1. As shown in Figure 1, the information bits are encoded, rate-matched and modulated based on adaptive modulation and coding (AMC) set. Then the signal is processed by the N-point IFFT such as

$$b(n) = \text{IFFT}\{B(k)\} = \sum_{k=0}^{N-1} B(k)\exp(j2\pi kn/N) \quad n = 0,1,2,\cdots,N-1 \qquad (1)$$

where $B(k)$ is the data sequence of length N. Then the output of IFFT is converted from parallel to serial (P/S), and inserted by the redundancy in the form of a guard interval (GI) of length larger than maximum delay spread such as

$$x(n) = \begin{cases} b(N+n), & n = -G,-G+1,\cdots,-1 \\ b(n), & n = 0,1,2,\cdots,N-1 \end{cases} \qquad (2)$$

where $x(n)$ is the transmitted signals, G is the GI length. Finally, GI-added IFFT output $x(n)$ is up-converted at the carrier frequency and transmitted over the frequency-selective fading channel with additive white Gaussian noise (AWGN).

Please amend the paragraph beginning on page 2, line 6 as follows:

The received signal at the UE is given by

$$r(t) = h(t) \otimes x(t) + n(t) \tag{3}$$

where $\otimes$ denotes the convolution operation,

$$h(t) = \sum_{l}^{L} a_l(t)\delta(t - \tau_l) \tag{4}$$

is the channel impulse response in time domain, L is the number of paths, $a_l(t)$ is the complex channel coefficient at the l^{th} path, τ_l is the tap delay, $\delta(t)$ is the delta function, $n(t)$ is the additive white Gaussian noise. The GI is removed from the received signal and the GI-removed signal is processed by FFT as follows

$$y(n) = r(n + G), \quad n = 0,1,2,\cdots,N-1 \tag{5}$$

$$Y(k) = \mathrm{FFT}\{y(n)\} = \frac{1}{N}\sum_{n=0}^{N-1} y(n)\exp(-j2\pi kn/N) \quad k = 0,1,2,\cdots,N-1 \tag{6}$$

Please amend the paragraph beginning on page 2, line 24 as follows:

If the bandwidth of each subcarrier is much less than the channel coherence bandwidth, a frequency flat channel model can be assumed at each subcarrier so that only a one-tap equalizer is needed for each subcarrier at the receiver. With the channel estimates in frequency domain $H(k)$, the received signal can be equalized by zero-forcing detector such as

$$\hat{B}(k) = (H(k))^{-1} Y(k) = \frac{H^*(k)Y(k)}{|H(k)|^2} \quad k = 0,1,2,\cdots,N-1 \tag{7}$$

or in minimum mean square error (MMSE) criteria such as

$$\hat{B}(k) = \frac{H^*(k)Y(k)}{|H(k)|^2 + \sigma^2} \quad k = 0,1,2,\cdots,N-1 \tag{8}$$

where $(\ )^*$ and $|\ |^2$ denote the complex conjugate operation and power respectively, σ^2 is the noise variance. Then the equalized signal is demodulated, rate matched and decoded correspondingly.

Please amend the paragraph beginning on page 4, line 22 as follows:

Selective scrambling in frequency domain has been proposed for OFDM to reduce the peak to average power ratio (PAR) (see *Yang et al.* "Peak-to-Average Power Control in OFDM Using Standard Arrays of Linear Block Codes" *IEEE Commun. Letters*, vol.7, No. 4, pp. 174-176, April 2003; *Eetvelt et al.* "Peak-to-Average Power Reduction for OFDM Schemes by Selective Scrambling", *IEE Electronics Letters*, Vol. 32, No. 21, pp. 1963-1964, Oct. 1996). A cell specific code has been proposed to scramble the signals in frequency domain for fast cell search in orthogonal frequency and code division multiplexing (OFCDM) and multicarrier CDMA systems (see *Tanno et al.* "Three-Step Fast Cell Search Algorithm Utilizing Common Pilot Channel for OFDM Broadband Packet Wireless Access" *IEE VTC-Fall*, Vol, 3, pp. 24-28, 2002; *Hanada et al.* "Three-Step Cell Search Algorithm for Broadband Multi-carrier CDMA Packet Wireless Access", *IEEE PIMRC*, Vol. 2, pp. G32-37, 2001). A pseudo-noise (PN) code scrambling in time domain has been also applied for user separation in OFDM-CDMA system (see *Kim et al.*, "An OFDM-CDMA Scheme Using Orthogonal Code Multiplexing and Its Parallel Interference Cancellation Receiver", *IEEE ISSSTA*, pp. 368-372, Czech Rep. Sept. 2002). However, the scrambling in frequency domain cannot suppress the interference impact induced by neighboring cells for reuse-one OFDM systems.

Please amend the paragraph beginning on page 10, line 30 as follows:

In the OFDM transmitter 10 as shown in Figure 2, the information bits 112 provided by the data source block 12 is encoded by the channel encoder 14 into coded bits 114. After being rate-matched and modulated by the modulation block 16, the coded bits become code symbols 116 or $B(k)$. The IFFT output 118 from the N-Point IFFT block 18 is converted by a parallel-to-serial block 20. According to the present invention, the conventional symbols 120 or $b(n)$ after the IFFT operation in Eq.1 are scrambled in time domain by the corresponding long scrambling sequence such as:

$$\hat{b}(n) = c_i(n) \times b(n) \quad n = 0,1,2,\cdots,N-1 \tag{14}$$

where $c_i(n)$ is the part of the long scrambling sequence corresponding to i^{th} OFDM symbol. The scrambled signal $\hat{b}(n)$, or the scrambled OFDM symbols 122 is GI (guard interval) inserted at block 24 as in Eq.2 and then the transmit signal 124 is transmitted.

Please amend the paragraph beginning on page 11, line 10 as follows:

Similar to the conventional OFDM receiver, the received signal 150 received by the OFDM receiver 50, according to the present invention, is processed by block 52 for GI removal. The output 152 is converted by a serial-to-parallel block 54. The time-domain received signal 154 is transformed into frequency-domain (TD) by FFT operation, as in Eq.6, by the N-Point FFT 56 into frequency-domain (FD) signal 156. The FD signal $Y(k)$ is equalized by block 58 as in Eq. 7. The equalized signal 158 is transformed into time domain by IFFT operation 60 as in Eq.1 into equalized TD signal 160, or $\tilde{b}(n)$. The time-domain equalized signal 116 is descrambled by the corresponding scrambling code at block 62 such as

$$\bar{b}(n) = c_i^*(n) \times \tilde{b}(n) \quad n = 0,1,2,\cdots,N-1 \tag{15}$$

Please amend the paragraph beginning on page 13, line 28 as follows:

The present invention is applicable in any kind of wireless OFDM communications, including, but not limited to, WLAN, cellular OFDM and multicarrier-CDMA(for pico-, micro- and macro-cell environments) transceivers. The present invention can be used for wideband data communications over mobile radio channels, high bitrate digital subscriber lines (HDSLs), asymmetric digital subscriber lines (ADLs) and digital broadcasting.